

1 CLAIMS:

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3 1. An apparatus for spraying liquid surface treatment
4 material, said apparatus comprising:

5 a housing;

6 a liquid inlet for supply of the liquid surface
7 treatment material;

8 a gas inlet for supply of pressurised gas to be
9 mixed with the liquid surface treatment material;

10 an outlet nozzle through which the gas and liquid
11 surface treatment material is sprayed;

12 a control valve adapted to regulate the supply of
13 the liquid surface treatment material to the outlet
14 nozzle;

15 a gas valve operable between an open position and
16 a closed position;

17 a first communicating passageway connecting said
18 gas inlet to said gas valve; and

19 a second communicating passageway connecting said
20 gas valve to said outlet nozzle;

21 wherein said second passageway is provided with a
22 stepped portion therein so that a gas vortex is created
23 therethrough.

24

25 2. An apparatus according to Claim 1, wherein said
26 second passageway is offset from said first passageway.

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28 3. An apparatus according to either Claim 1 or Claim
29 2, wherein said second passageway is substantially
30 conical in shape.

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32 4. An apparatus according to any preceding claim,
33 wherein said second passageway includes an inlet and an
34 outlet, wherein said second passageway is tapered from
35 said inlet to said outlet.

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1 5. An apparatus according to Claim 4, wherein said
2 taper is between 1 to 15°.

3
4 6. An apparatus according to either Claim 4 or Claim
5 5, wherein said second passageway has a radius of
6 curvature at said outlet so as to provide gas to the
7 outlet nozzle in a substantially horizontal direction.

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9 7. An apparatus according to any preceding claim,
10 wherein said stepped portion of said second passageway
11 comprises a ledge whose width tapers up to a maximum of
12 10% of the radius of said second passageway at the
13 level of the stepped portion.

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15 8. An apparatus according to Claim 7, wherein the
16 longitudinal axis of said outlet nozzle extends across
17 said second passageway.

18
19 9. An apparatus according to Claim 8, wherein the
20 axis of symmetry of said ledge is offset from said
21 longitudinal axis of said outlet nozzle.

22
23 10. An apparatus for spraying liquid surface treatment
24 material, said apparatus comprising:

25 a housing;

26 a liquid inlet for supply of the liquid surface
27 treatment material;

28 a gas inlet for supply of pressurised gas to be
29 mixed with the liquid surface treatment material;

30 an outlet nozzle through which the gas and liquid
31 surface treatment material is sprayed;

32 a control valve adapted to regulate the supply of
33 the liquid surface treatment material to the outlet
34 nozzle;

35 a gas valve operable between an open position and
36 a closed position;

1 a first communicating passageway connecting said
2 gas inlet to said gas valve; and
3 a second communicating passageway connecting said
4 gas valve to said outlet nozzle;
5 wherein said second passageway is axially offset
6 from said first passageway and is substantially conical
7 in shape, and wherein said second passageway includes
8 an inlet and an outlet and is tapered from said inlet
9 to said outlet at an angle of taper of between 1 and
10 15°.

11
12 11. An apparatus according to any preceding claim,
13 further comprising a trigger means;
14 whereby said trigger means is adapted to operate
15 both of said control valve and said gas valve.

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17 12. An apparatus according to Claim 11, wherein said
18 control valve is a liquid control needle valve.

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20 13. An apparatus according to Claim 12, wherein said
21 gas valve is an axially-sliding piston valve.

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23 14. An apparatus according to Claim 13, wherein said
24 outlet nozzle is controlled by said liquid control
25 needle valve.

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27 15. An apparatus according to either Claim 13 or Claim
28 14, wherein said piston valve produces an annular air
29 jet in said second passageway.

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31 16. An apparatus according to any of Claims 13 to 15,
32 further comprising an air control valve stem which is
33 connected to said piston valve and operated by said
34 trigger means.

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36 17. An apparatus according to any of Claims 13 to 16,

1 wherein said piston valve comprises an inner apertured
2 sleeve and an outer apertured sleeve, said inner and
3 outer sleeves being co-axial, and wherein said inner
4 sleeve is located within said outer sleeve and is
5 rotatably adjustable relative to said outer sleeve.
6

7 18. An apparatus according to any of Claims 12 to 17,
8 wherein the liquid control needle valve is controlled
9 by said trigger means via an axially-sliding sleeve or
10 slipper member situated on a rearward portion of said
11 housing.
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13 19. An apparatus according to any of Claims 12 to 18,
14 wherein said liquid control needle valve is provided
15 with a rotational flow adjustment means.
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17 20. An apparatus according to Claim 19, wherein said
18 flow adjustment means comprises a stem member, a
19 rotational adjuster, and a return spring, said stem
20 member being threaded at its rearmost extremity to
21 accept said rotational adjuster.
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23 21. An apparatus according to Claim 20, wherein said
24 stem member is actuated externally by said trigger
25 means, and is returned to its initial position by said
26 return spring.
27

28 22. An apparatus according to any of Claims 12 to 21,
29 wherein said liquid inlet comprises a pressurized
30 material supply connector, and wherein said needle
31 valve is supplied with a liquid by said pressurized
32 material supply connector.
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34 23. An apparatus according to any of Claims 12 to 21,
35 wherein said liquid inlet comprises a gravity feed
36 liquid reservoir, and wherein said needle valve is

1 supplied with a liquid by said gravity liquid
2 reservoir.

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4 24. An apparatus according to any preceding claim,
5 further comprising a regulating valve and a pair of
6 side jets, whereby the spray pattern of the outlet
7 nozzle is regulated by said regulating valve, and said
8 side jets are utilised to regulate said spray pattern.

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10 25. A method of spraying a liquid onto a surface, said
11 method comprising the steps of:

12 supplying a liquid to be sprayed into a liquid
13 inlet of a spray apparatus;

14 supplying a pressurised gaseous propellant into a
15 gas inlet of said spray apparatus;

16 passing said gaseous propellant through a
17 communicating passageway from said gas inlet to an
18 outlet nozzle;

19 accelerating said gaseous propellant by creating a
20 gas vortex as said propellant passes through said
21 communicating passageway;

22 passing said accelerated propellant through an
23 outwardly tapering portion of the communicating
24 passageway to further accelerate the vortex and supply
25 the propellant to the outlet nozzle in the form of an
26 annular gas jet; and

27 spraying said liquid onto a surface by mixing said
28 liquid and said annular gas jet at said nozzle.

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30 26. A method according to Claim 25, wherein said
31 passageway comprises an upper portion and a lower
32 portion, wherein said upper portion is axially offset
33 from said lower portion and is substantially conical in
34 shape.

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36 27. A method according to Claim 26 wherein said upper

1 portion of said passageway includes an inlet and an
2 outlet and is tapered from said inlet to said outlet at
3 an angle of taper of between 1 and 15°.

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5 28. A method according to any of Claims 25 to 27,
6 wherein the mixing of said liquid and said annular gas
7 jet is controlled by a trigger valve mechanism on said
8 spray apparatus.

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10 29. A method according to Claim 28, wherein said
11 trigger valve mechanism comprises:

12 a gas valve operable between an open position and
13 a closed position;

14 a control valve adapted to regulate the supply of
15 the liquid to be sprayed; and

16 a trigger means;

17 whereby said trigger means is adapted to operate
18 both of said gas and control valves.

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20 30. A method according to Claim 29, wherein said
21 control valve is a liquid control needle valve.

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23 31. A method according to Claim 30, wherein said gas
24 valve is an axially-sliding piston valve.

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26 32. A method according to Claim 31, wherein said
27 piston valve comprises an inner apertured sleeve and an
28 outer apertured sleeve, said inner and outer sleeves
29 being co-axial, and wherein said inner sleeve is
30 located within said outer sleeve and is rotatably
31 adjustable relative to said outer sleeve.

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